ABSTRACT OF THE DISCLOSURE

A new methodology of monitoring process drift and chamber seasoning is presented based on the discovery of the strong correlation between chamber surface condition and free radical density in a plasma. Lower free radical density indicates either there is a significant process drift in the case of production wafer etching or that the chamber needs more seasoning before resuming production wafer etching. Free radical density in the plasma is monitored through measuring the emission intensities of free radicals in the plasma by an optical spectrometer. A timely detection of the extent of process drift and chamber seasoning can help to minimize the chamber downtime and improve its throughput significantly. Such method can also be implemented in existing production wafer etching or chamber seasoning practices in an in-situ, real-time, and non-intrusive manner.